

5. Contents of Reply

(1) According to the second written opinion dispatched on Aug. 23, 2005, the examiner says that since the Document No. 1 (Japanese Laid-Open Patent Publication No. 11-256202) contains description that the particle diameter of the binder resin powder is adjusted to be a half or smaller than that of the amorphous soft magnetic alloy powder and the ratios of the amorphous soft magnetic alloy powder, glass powder, and epoxy resin powder are controlled to be in the respective ranges of prescribed % by weight and the composition obtained in such ratios can be regarded as a composition of which the resin material is fused so as to partially cover the surface of the soft magnetic material powder, the present inventions claimed in claims 1 to 5 and 7 to 17 do not have the novelty and the inventive step.

(2) However, as explained below, the composite powder described in the Document No. 1 has an utterly different structure from that of the composite powder of the present invention.

(i) The composite powder of the present invention is, as described in claim 1, a soft magnetic composite powder characterized in that the surface of the soft magnetic material powder is covered with an electrical insulating material containing at least an inorganic insulating material, and a resin material is fusion-bonded to the surface of the inorganic insulating material so as to partially cover the surface of the soft magnetic material powder. That is, according to the present invention since the resin material partially covers the surface of the soft magnetic material powder, the resin material can freely be deformed as compared with the case of covering entirely, and that is, the resin material is freely deformable on the fused point of the

inorganic insulating material as a supporting point, and the particles of the soft magnetic material brought into contact with the resin material change the moving direction owing to the deformation of the resin material, and are enabled to move to the voids among the powder particles, and consequently it is made possible to increase the packing density with low press pressures (described in p. 3, l. 27 to p. 4, l 9 of the specification originally filed).

(ii) On the other hand, the raw material powder 1, as described in the paragraph [0025], is produced by weighing the amorphous soft magnetic alloy powder 80% by volume, the glass powder 10% by volume, and the epoxy resin powder 10% by volume, loading them to a ball mill, and mixing them for 24 hours. As common knowledge in this industrial field, in the case of mixing these three parties: the amorphous soft magnetic alloy powder, the glass powder, and the epoxy resin powder by a ball mill, it gives a composite powder containing the amorphous soft magnetic alloy powder and the glass powder entirely covered with the resin powder which is the softest and most deformable among these three parties and bonded with each other by the resin powder.

Although having a structure that the surface of the amorphous soft magnetic alloy powder is coated with the resin material as the examiner describes in the written opinion, the raw material powder 1 does neither have the structure that the alloy powder is covered with the glass powder nor have the structure that the resin powder partially covers the amorphous soft magnetic alloy powder but entirely covers the whole surface.

Accordingly, the raw material powder 1 is not a composite powder of the present invention characterized in that the surface of the soft magnetic

material powder is covered with at least an inorganic insulating material and the resin material is fusion-bonded to the surface of the inorganic insulating material so as to partially cover the surface of the soft magnetic material powder. With respect to the raw material powder 1, since the surface of the soft magnetic material powder is completely covered with the resin material, the deformability of the resin material is low and the soft magnetic material powder is difficult to move and the packing density cannot be improved unless rather high pressure is applied as compared with that in the case of the invention.

(iii) Further, as described in the paragraph [0026], the raw material powder 2 of the Document No. 1 is produced by loading a powder of composite particles each comprising a mother particle of an amorphous soft magnetic alloy and a glass layer covering the surface of the mother particle together with a binder resin powder into a ball mill and mixing them for 24 hours. With respect to the raw material powder 2, although the surface of the soft magnetic material powder is covered with the glass layer, which is an inorganic insulating material, if the powder is mixed by a ball mill for 24 hours, only a composite powder of which the glass layer is entirely covered with the binder resin is obtained.

The raw material powder 2 has a structure that the glass layer is entirely covered with the binder resin but has no structure that the glass layer is partially covered. Further, the resin is not fusion-bonded to the glass layer only by binding, so that the resin cannot freely be deformed around the fusion-bonded point.

Accordingly, the raw material powder 2 is not the composite powder

of the present invention characterized in that the resin material is fusion-bonded to the surface of the inorganic insulating material so as to partially cover the soft magnetic material powder. Also with respect to the raw material powder 2, similarly to the raw material powder 1, since the entire surface of the soft magnetic material powder is completely covered with the resin material, the deformability of the resin material is low and the soft magnetic material powder is difficult to move and the packing density cannot be improved unless rather high press-pressure is applied as compared with that in the case of the invention.

(iv) Further, as described in the paragraph [0027], the raw material powder 3 of the Document No. 1 is produced by weighing 80% by volume of an amorphous soft magnetic alloy, 10% by volume of a glass powder, and 10% by volume of an epoxy resin powder, loading them into a powder coating apparatus, and forming a layer of the glass and epoxy resin on the surface of the mother particles of the amorphous soft magnetic alloy powder.

Accordingly, the raw material powder 3 is not a composite powder of the present invention characterized in that the surface of the soft magnetic material powder is covered with at least an inorganic insulating material and the resin material is fusion-bonded to the surface of the inorganic insulating material so as to partially cover the surface of the soft magnetic material powder. Also with respect to the raw material powder 3, similarly to the raw material powder 1, since the entire surface of the soft magnetic material powder is completely covered with the resin material, the deformability of the resin material is low and the soft magnetic material powder is difficult to move and the packing density cannot be improved

unless rather high press-pressure is applied as compared with that in the case of the invention.

(3) The Document No. 1 does not disclose or imply any description relevant to the composite powder characterized in that the surface of the soft magnetic material powder is covered with at least an inorganic insulating material and a resin material is fusion-bonded on the surface of the inorganic insulating material so as to partially cover the surface of the soft magnetic material powder that is the essential point of the present invention.

Accordingly, the present invention is not identical with the invention described in the Document No. 1 and a person skilled in the art could not have easily arrived on the basis of the invention described in the Document No. 1.

(4) Additionally, claims 8, 9, 14, and 16 corrected in the written amendment submitted on the same day will be described.

(i) Claims 8 and 14 are amended on the basis of the description from p. 6, l. 26 to p. 7 l. 1 and claims 9 and 16 are amended on the basis of the description from p. 8, l. 15 to l. 19 in the specification originally filed.

(ii) The weight ratio 3 to 8 wt.% of the resin material in claim 8 is explained to be equivalent to 13.8 to 32.7 vol.% by conversion employing the density values of the materials used in the invention, practically 3.0 g/cm³ for the inorganic insulating material, 1.25 g/cm³ for the resin material, and 7.0 g/cm³ for the soft magnetic alloy powder. Similarly, the weight ratio 3 to 8 wt.% in claim 9 is explained to be equivalent to 13.2 to 32.7 vol.% by conversion. This is out of the range of 80 vol.% of the amorphous soft magnetic alloy powder, 10 vol.% of the glass powder, and 10 vol.% of the

epoxy resin powder described in [0025] of the Document No. 1.

(iii) The examiner points out in the written opinion as saying there is a description in the Document No. 1 that the particle diameter of the bonding resin powder is adjusted to be 0.1 to 10 μm and the particle diameter of the amorphous soft magnetic alloy powder is adjusted to be 100 to 150 μm , and the amorphous soft magnetic alloy powder, the glass powder, and the epoxy powder are mixed at ratios of 80 vol.%, 10 vol.%, and 10 vol.%, respectively; however, the ratios of the powders are as described in [0025] are of the amorphous soft magnetic alloy powder with the maximum particle diameter of about 100-mesh and the epoxy resin powder with the maximum particle diameter of about 100-mesh. That is, the Document No. 1 does not have a description of the composition ratios as described in the original claims 9 and 16 in the case the particle diameter of the synthetic resin powder is defined to be a half of or smaller than that of the amorphous soft magnetic alloy powder.

Further, as described in (ii), in the amendment of this time, the composition ratios in as described in the amended claims 9 and 16 are made clear to be out of the range of ratios of 80 vol.% of the amorphous soft magnetic alloy powder, 10 vol.% of the glass powder, and 10 vol.% of the epoxy powder described in [0025] of the Document No. 1.

Consequently, also the present inventions described in claims 9 and 16 are neither identical with the invention described in the Document No. 1 nor a thing at which a person skilled in the art could have easily arrived on the basis of the invention described in the Document No. 1.

答 弁 書

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PCT / JP 2004 / 005772



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5. 答弁の内容

(1) 2005年8月23日(発送日)付の2回目の見解書によれば、審査官殿は、文献1(特開平11-256202号公報)には結着性樹脂粉末の粒径を非晶質軟磁性合金粉末の粒径の半分以上とすると共に、非晶質軟磁性合金粉末、ガラス粉末、エポキシ樹脂粉末の比率を所定の重量%の範囲内としたものが記載されていると認められ、そのような比率としたものは、軟磁性体粉末の表面を部分的に覆うように樹脂材料が融着されたものと認められるので、請求の範囲1-5と7-17に係る発明は新規性と進歩性を有しない、と判断されております。

(2) しかしながら、以下に説明致しますように、文献1に記載された複合粉末は、本願発明に係る複合粉末とは全く異なる構造を有するものであります。

(i) 本願発明の複合粉末は、請求の範囲1に記載の通り、軟磁性体粉末の表面が少なくとも無機絶縁性材料を含む電気絶縁性材料で被覆され、該無機絶縁性材料の表面には軟磁性体粉末の表面を部分的に覆うように樹脂材料が融着されて成るものであります。すなわち、本願発明によれば、樹脂材料が軟磁性体粉末の表面を部分的に覆っているため、全面を覆う場合に比べより自由に変形でき、すなわち、樹脂材料が無機絶縁材料との融着部を支点として自由変形可能であり、樹脂材料に接触した軟磁性体粉末は樹脂材料の変形によりその移動方向を変え、粉末粒子間の空隙に移動することが可能となり、これにより、より小さなプレス圧力で充填密度を高めることができるという効果を有するものであります(出願時明細書3頁27行~4頁9行に記載)。

(ii) これに対し、文献1の原料粉末①は、【0025】に記載の通り、非晶質軟磁性合金粉末80vol%、ガラス粉末10vol%、エポキシ樹脂粉末10vol%となるように秤量し、ボールミルに投入して24時間混合して調製することができます。当該技術分野の技術常識として、非晶質軟磁性合金粉末とガラス粉末とエポキシ樹脂粉末の三者をボールミル混合した場合、非晶質軟磁性合金粉末をガラス粉末が被覆するのではなく、この三者の中で最も柔らかく変形し易い樹脂粉末が非晶質軟磁性合金粉末とガラス粉末をそれぞれの全面を被覆して両者を結着した複合粉末が得られます。

原料粉末①は、審査官殿が見解書に記載しているように、非晶質軟磁性合金粉末の表面を樹脂材料が覆った構成を有してはいますが、ガラス粉末で被覆される構成を有していません。また、樹脂粉末が非晶質軟磁性合金粉末の全面を被覆するため、部分的に覆うという構成も有していません。

したがって、原料粉末①は、本願発明のように軟磁性体粉末の表面が少なくとも無機絶縁性材料で被覆され、その無機絶縁性材料の表面に軟磁性体粉末の表面を部分的に覆うように樹脂材料が融着された複合粉末ではありません。原料粉末①は、軟磁性体粉末の表面が樹脂材料で完全に覆われているため、樹脂材料の変形の自由度が小さく、軟

磁性体粉末の移動しにくいことから、本願発明に比べかなり大きなプレス圧力をかけないと充填密度を上げることはできません。

(iii) また、文献1の原料粉末②は、【0026】に記載の通り、非晶質軟磁性合金を母粒子とする粒子の表面にガラスの層が被覆された複合粒子粉末と、結着性樹脂粉末をボールミルに投入し、24時間混合して調製することができます。原料粉末②は、軟磁性体粉末の表面が無機絶縁性材料であるガラス層で被覆されていますが、24時間ボールミルで混合すると、ガラス層の全面が結着性樹脂で覆われた複合粉末しか得られません。

原料粉末②は、ガラス層を結着性樹脂で全面を覆う構成を有しているため、部分的に覆うという構成を有しておりません。また、樹脂は結着のみで融着していないため融着部を支点とする自由変形ができません。

したがって、原料粉末②は、本願発明のように無機絶縁性材料の表面に軟磁性体粉末の表面を部分的に覆うように樹脂材料が融着された複合粉末ではありません。原料粉末②も原料粉末①の場合と同様、軟磁性体粉末の表面が樹脂材料で完全に覆われているので、樹脂材料の変形の自由度が小さく、軟磁性体粉末の移動しにくいことから、本願発明に比べかなり大きなプレス圧力をかけないと充填密度を上げることはできません。

(iv) また、文献1の原料粉末③は、【0027】に記載の通り、非晶質軟磁性合金粉末 80vol%、ガラス粉末 10vol%、エポキシ樹脂粉末 10vol%となるように秤量して、粉末コーティング装置に投入して、非晶質軟磁性合金粉末からなる母粒子の表面にガラスとエポキシ樹脂の層を被覆形成して調製することができます。

したがって、原料粉末③は、本願発明のように軟磁性体粉末の表面が少なくとも無機絶縁性材料で被覆され、その無機絶縁性材料の表面に軟磁性体粉末の表面を部分的に覆うように樹脂材料が融着された複合粉末ではありません。原料粉末③も原料粉末①の場合と同様、軟磁性体粉末の表面が樹脂材料で完全に覆われているので、樹脂材料の変形の自由度が小さく、軟磁性体粉末の移動しにくいことから、本願発明に比べかなり大きなプレス圧力をかけないと充填密度を上げることはできません。

(3) さらに、文献1には、本願発明の要旨である、軟磁性体粉末の表面が少なくとも無機絶縁性材料で被覆され、その無機絶縁性材料の表面に軟磁性体粉末の表面を部分的に覆うように樹脂材料が融着された複合粉末に関し、開示も示唆もありません。

従いまして、本願発明は、文献1に記載された発明と同一でもなく、また文献1に記載された発明に基づいて当業者が容易になし得たものでもありません。

(4) なお、同日に提出する手続補正書で補正した請求の範囲8、9、14、16について説明致します。

(i) 請求の範囲8と14は、出願時明細書6頁26行～7頁1行の記載に基づくも

のであり、請求の範囲9と16は、出願時明細書8頁15行～19行の記載に基づくものであります。

(ii) ここで、請求の範囲8の樹脂材料3～8wt%を、本願発明で使用した材料の密度の値、具体的には無機絶縁性材料 3.0g/cm³、樹脂材料 1.25g/cm³、軟磁性合金粉末 7.0g/cm³の値を用いて vol%に換算すると、13.8～32.7vol%であります。同様に請求の範囲9の樹脂材料3～8wt%を、vol%に換算すると 13.2～32.7vol%であります。これは、文献1の【0025】に記載された非晶質軟磁性合金粉末 80vol%、ガラス粉末 10vol%、エポキシ樹脂粉末 10vol%の範囲外であります。

(iii) 審査官殿は、見解書において文献1に、「結合性樹脂粉末の粒径を 0.1～10μm、非晶質軟磁性合金粉末の粒径を 100～150μmとすること、非晶質軟磁性合金粉末を 80vol%、ガラス粉末を 10vol%、エポキシ樹脂粉末を 10vol%となるように混合すること」も記載されており」と指摘しておられますが、その各粉末の構成比は、【0025】に記載の通り、最大粒径約100メッシュの非晶質軟磁性合金粉末と、最大粒径約100メッシュのエポキシ樹脂粉末を対象とするものであります。すなわち、文献1には、結合性樹脂粉末の粒径を非晶質軟磁性合金粉末の粒径の半分以下とした場合に、本願発明の補正前の請求の範囲9と16に記載した構成比とすることは記載されていません。

さらに、上記(ii)で説明しましたように、今回の補正により、補正後の請求の範囲9及び16における構成比が、文献1の【0025】に記載された非晶質軟磁性合金粉末 80vol%、ガラス粉末 10vol%、エポキシ樹脂粉末 10vol%の範囲外であることを明確に致しました。

従いまして、請求の範囲9及び16に記載された発明も、文献1に記載された発明と同一でもなく、また文献1に記載された発明に基づいて当業者が容易になし得たものでもありません。

以上